Explanatory Authority, Appropriation, and Astronomy

Essay Review

Robert S. Westman, *The Copernican Question. Prognostication, Skepticism, and Celestial Order* (Berkeley/Los Angeles/London: University of California Press, 2011). xviii+681 pp. ISBN 978-0-520-25481-7.

Submitted to *The British Journal for the History of Science*, to be published in the March 2013 issue

1. The trouble with Copernicanism

DEAR READER. It is not impossible that certain rumors surrounding Robert Westman's 'big book' have preceded your actual experiences with it. For instance, you may have been told how Westman claims that astrology explains the rise of Copernicanism. Such a presentation of *The Copernican Question* (2011, henceforth *CQ*) may explain why our author revised his perspective in the course of writing the book (cf. p. xvi), but it does not explain why it had to be written in the first place.

If nothing else, *CQ* argues that the very notion of "Copernicanism", as the protagonist of narratives about early modern astronomy (and early modern science in general), just isn't very helpful. This, I believe, is a very important point to make, even if Westman's own narrative doesn't always make this sufficiently clear. Accordingly, let us begin with 'the trouble with Copernicanism'.

The introduction to *CQ* strongly emphasizes the importance of Thomas Kuhn's classic *The Copernican Revolution* (1957, henceforth *CR*) in shaping a narrative template for stories about Copernicanism. According to this narrative, "Copernicanism" is primarily a phenomenon of "theoretical illumination or breakthrough" on the level of what one might call 'cosmological convictions' (i.e., guiding images of what the universe is like). Such "discovery" is then followed by "diffusion, reception, and assimilation" while facing "obdurate resistance" (*CQ*, p. 3b).

The most interesting aspect of this narrative, in my opinion, is not so much its influence or impact, as the fact that it is not really historical at all. Instead, Kuhn provided a story which basically identified the earliest members of a contemporary scientific community through their adherence to heliocentrism, and which recounted how this novel social body gradually expanded and overcame theoretical difficulties. Such celebratory narratives were hardly new in 1957, with their strong debts to the 19th-century approach to historiography as providing a gallery of the dearly departed for the grateful living. As Westman rightly points out, Kuhn's main innovation lay in his different evaluation of what constitutes a scientific community in the first place: not so much its privileged relation to an absolute truth, as its adherence to heuristically fruitful theoretical frameworks (*CQ*, p. 3b).

Despite his farewell to a correspondence theory of truth, Kuhn clearly understood this fruitfulness not so much as opening up new possibilities in specific domains of scientific endeavour, bur rather in the stronger sense of imposing new *necessities* on adherents to such frameworks. Taking the Copernican picture of the world seriously, Kuhn seemed to assume, was to enter a situation in which it became *impossible* to take traditional Aristotelian physics seriously. This assumption explains

Kuhn's remarkable treatment of Tycho Brahe's relation to the 1572 new star. In *CR*, the 1572 nova essentially played the role of a *deus ex machina* which weakened the credibility of Aristotelian natural philosophy by virtue of being superlunary. Certainly, it was the pesky Tycho Brahe who actually brought the message that "the basic contrast between the superlunary region and the corruptible earth was in question", but for Kuhn, this simply meant that Tycho was actually *already* working for "the success of Copernicanism", to which "the Aristotelian cosmological tradition" was "the principal barrier". Putting it clearly and succinctly, Kuhn claimed that "any break with the tradition worked for the Copernicans (…)" (pp. 206-7) – even when it was carried out by an "anti-Copernican" like Brahe (p. 209).

This reminder makes it all the more apparent how, long before *CQ*, Westman's earlier papers and books already managed to change historical narratives about early modern astronomy and science. More than anybody else, it is Westman who shaped the current situation in which finding an academic textbook on the Scientific Revolution which upholds the Kuhnian sense of a necessitated Copernican 'revolution', has become virtually impossible. Consider John Henry's fine *The Scientific Revolution and the Origins of Modern Science*. Referencing a famous 1980 paper by Westman, Henry writes that "Copernicus must still be regarded as a radical innovator in astronomy, and as one of the prime movers in the formation of a new role for the astronomer – as a natural philosopher" (ed. 2002, p. 17).

The narrative focus here is still on a phenomenon which one could call "Copernicanism", and to this extent, one could still argue that these narratives are not so much historiographies, as parables of modern scientific life and its ideals. The meaning of "Copernicanism", however, is now very different from what was the case in 1957. It no longer stands for an almost fateful adherence to new 'cosmological' doctrine, but rather for the phenomenon of Copernican astronomers "encroaching (…) upon the territory of natural philosophy" (ed. 2002, pp. 19-20), in the strict sense of proposing *alternative* doctrine about reality. "Copernicanism", then, is not so much a phenomenon in the history of scientific doctrine, but rather a social and psychological phenomenon (which, as I emphasized before, is not precisely the same as a historical phenomenon).

More specifically, the central core of "Copernicanism" appears to be identified with (1) stubborn human resistance to external forces of authority and disciplining (a resistance which is already symbolised in the very act of taking the Copernican system seriously as a representation of reality), and (2) a positive, non-necessary *desire* to claim both a voice and a name in other, more prestigious socio-disciplinary domains. If there is a suprahuman historical movement at work here, it is one of the carving out of an autonomous scientific community *as such* (i.e., free from external authority and disciplining).

Such broad historiographical shifts are not only apparent in the densely populated realm of undergraduate textbooks. They also manifested themselves in the rare examples of grand narratives about early modern Copernicanism between *CR* and *CQ*. Rienk Vermij's exceptional *The Calvinist Copernicans*, for instance, ended as follows:

> "Judging from the Dutch evidence, the position of the Copernican system during the scientific revolution was that of an icon, a rallying-cry, a point of reference, or even a shibboleth. The various arguments for or against proved less important than its simple presence as an ideal, a challenge to traditional learning or a symbol of the new. It does not seem that the many

discussions centred on the subject had in themselves an important impact on the development of the new learning" (p. 375).

Contrary to what obtained in these earlier narratives, *CQ* introduces the important difference of taking neither a scientific community nor the figure of "the Copernican astronomer" as its main protagonist, but rather 'the Copernican question' of its title.[1] This question takes the form "Is the earth motionless at the center of a finite, star-studded sphere, or is it a planet moving in an annual circuit around the center?", and is the source of historical change in two main ways. First of all, through the fact that, instead of being only brought up in order to be refuted (as was the case between the 13th and 15th centuries), such "alternative possibilities" (p. 1a) were now actively entertained or ignored. Secondly, the fact that this question was now raised and discussed in print, introduced important new possibilities as to the social regions which could encounter and appropriate the issue – or not.

Of these two, it is the first which is most important here. It allows Westman to focus on the community of practitioners of "the science of the stars": a defunct body of knowledge which comprised our astronomy and astrology, and which was usually practised in making predictions of the future by inspecting (representations of) the visible heavens (chapter 1). More specifically, Westman's narrative privileges a handful of *rari nantes* who were drawn to the explanatory advantages of the Copernican ordering of the planets, and this –so Westman claims- out of a positive desire to fix astrology's theological and/or natural-philosophical credibility, as well as its "chronic predictive difficulties" (p. 513).

Such an approach turns *CQ* into a properly historical study. It is not difficult to read Westman's narrative *as if* it speaks of gradual progress in a timeless scientific community towards a more recognisable notion of 'astronomy' and disciplinary constellations. But this overlooks the tremendous amount of emphasis which he gives to the fact that such shifts in "the astronomer's role" were highly contingent and, more importantly, highly local. Indeed, one often gets the distinct sense that the main agent of trans-local migration of meanings in *CQ* is the amorphous presence called 'print culture' (cf. p. 17b), supplemented with letter exchange (pp. 361-2).

If anything, Westman sets out to take the variable ways in which the Copernican question was handled and interpreted, as a prism through which to detect locally differentiated notions of a satisfactory 'science of the stars'. The issue here is not so much whether there were "adherents of Copernicus", but rather "what form their adherence took" (p. 311a). Likewise, a focus on the historical record as evidence of belief changes, gives way to a Certalian uptake of this record as evidence of appropriation or "ways in which historical agents used, adapted, and transformed" (p. 21a). This prism also allows Westman to uncouple the Renaissance astronomer's desire to alter customary disciplinary expectations and relations on the one hand, and his adherence to Copernicus's proposal on the other (cf. p. 257b).

2. The evolution of the Copernican question

[1] As early as 1994, Westman used the precise phrase "Copernican Question" in referring to the present book. In 1986, however, Westman's contribution to an edited volume by Ronald Numbers and David Lindberg still announced a forthcoming book called *The Copernicans: Universities, Courts, and the Disciplines, 1543-1700*.

Despite the strongly anthropological and localising nature of Westman's brand of historicism, there is also historiography here: that is, a proper *story* of "the evolution of the Copernican question" (p. 394b; cf. p. 105b). This story stretches out over a "long sixteenth century" (p. 489b), and manifests ever more ambitious attempts to lay claim to the visible heavens as a 'proper' domain of explanation, and not just as a site where intimations of the future are given. Nevertheless, this evolution never quite separates itself from its origins in the celestial practitioner's prognosticatory activities, which began to "monopolize the right to make prophecies" in the 1490s (p. 70a).

In chapters 2 and 3, Westman's story roughly begins by making a convincing case for the triple claim that (1) Copernicus's Bologna period (1496-1500) socialized him into the prognosticator's world of the 'science of the stars'; (2) the publication of Giovanni Pico's anti-astrological *Disputations* (Bologna, 1496) forcefully opened up a crisis for this discipline; (3) Copernicus actually referenced the *Disputations* in *On the Revolutions*, and therefore probably at least looked at it himself. On this basis, Westman claims that *On the Revolutions* should be seen as a response to a problematic of planetary order, rather than planetary modeling (p. 56b); more specifically, that it sought to save the credibility of astrology's "core association of celestial causes and corresponding effects" (p. 87) by restoring its grounding in certainty about planetary ordering. This core problematic, solved by the 'systemic' properties of Copernicus's ordering proposal, also determined Copernicus's desire to have his celestial order be physically true, and this explains Copernicus's ulterior move "to address the physical implications of the Earth's motion" (p. 101b).

The history of the Copernican question then moves into purgatory, as it were, due to its coinciding with the age of Protestant and Catholic confessionalisation. The two texts which publicized Copernicus's proposal (*On the Revolutions* and Rheticus's *First Narration*) were not only targeted at the community of celestial practitioners, but also conceived as tools of persuasion, designed to turn the *possibility* of credible astrological theoretical doctrine -offered by Copernicus's reordering of the heavens- into a *reality*, and this in two religious communities (chapter 4). As tools of persuasion, both failed spectacularly, despite *First Narration*'s attempt to present Copernicus's proposal as singularly apt at predicting the future, and despite *On the Revolutions*'s emulation of the tactics of the "popular verse prophecies" (p. 66) in addressing the Roman curia (chapters 5-7).

As far as the Copernican question is concerned, this situation might very well have continued indefinitely. But the situation changed in the 1570s, and this due to the presence of another source of historical contingencies: nature.[2] Beginning in chapter 8, Westman focuses on two events in the visible heavens (the sudden apperance of a *nova* in 1572, and of a comet in 1577) which deepened the challenge for the prognosticators:

> "The prognosticators no longer faced the customary question of predicting where the planets would be at certain times so that their influences could be engaged or avoided, but that of

[2] Cf. p. 19b: "What distinguished the period 1572-1604 was that the initial challenge [to the traditional distinction between incorruptible celestial heavens and a changeable terrestrial realm] originated from a nontextual, nonhuman source: natural events in the "out there" -believed by contemporaries to be divinely caused- actually impinged on the perceptual apparatus of those who claimed to have observed something new".

> how to accommodate –and hence explain- celestial events that had not been anticipated and which did not recur" (p. 13b).

Both events, Westman points out, rapidly became the subject of a separate literature, turning them into distinct public events "such as would not have been conceivable" outside print culture (p. 230b; also cf. p. 250b). For most prognosticators, the evident script for accommodating such *unforeseeables* was to activate "the traditionalist alliance" with theology by switching discourses, and situating the *nova* in a "long-term apocalyptic narrative" (ibidem). Very different, however, was a small minority of "Nullists". These began to defend a clear-cut separation between Scripture and the visible heavens, and to deny the very possibility of encountering signs of the imminence of the Apocalypse in the latter legible surface. They also led the phenomenon to be "incorporated into the space of theoretical astronomy" on the strength of their parallax-measuring rather than prognosticatory skills:

> "A nova could be a portent, but only a *stella nova* could become a resource for contesting the Aristotelian proposition of celestial immutability. Such a claim to starhood rested on different calculational resources (...)" (p. 230b).

Finally, as this quote underlines, they rejected the traditional incommensurability between the 'monstrous' and the 'ordinary'; a rejection which manifested itself in their very willingness to speak of the *nova* as a new *star*, and to organize "a new problematic – *reconciling* the extraordinary and the ordinary course of nature [my italics]" (p. 235b) in the name of God's ordained power (pp. 242a, 257b).

It is against the background of this move that, for the very first time since 1543, we encounter a second generation of celestial practitioners who began "actively to engage the full text of *On the Revolutions*", rather than reading it "solely as a tool of astrological prognostication" (p. 259). More specifically, the new tendency to treat 'the heavens' as a private map in which to "park" (p. 278) even the rarest celestial phenomenon, put yet another premium on the explanatory advantages of the Copernican system. Despite such unprecedented "occasions to theorize about the order of the planets", the 1570s and 1580s "did nothing to create a new consensus. If anything, by the end of the decade there was even less agreement" (pp. 257-8).

Westman then moves towards a final "third-generation response (...) in which physical questions pushed to the fore and clearly became dominant" (p. 358b). The first decade of the 17th century is characterised as the time of a "new temper" (p. 16a) and "of remarkably rapid transition", in that there was a sudden "convergence of new modes of natural philosophizing with theoretical astronomy" (p. 374a). The novel self-evidence of an approach to astronomical theory from the angle of natural-philosophical issues is remarkable indeed; nevertheless, Westman stresses that this was hardly revolutionary, but a further development of the innovations of the 1580s and their "world-system wars" (pp. 14b, 372a).

Privileging Kepler and Galileo, Westman points out how both were still celestial practitioners providing astrological predictions (pp. 376-81). Nevertheless, the difference between the Protestant-Melanchtonian and the post-Tridentine Catholic attitude to astrology manifested itself most clearly in that Galileo, "unlike Kepler, had nothing to say about astrological theory" (p. 354b). In this respect, Galileo's early relation to Copernicus remains a phenomenon shrouded in mystery. Westman

suggests that his early socialisation in local, Italian debates on the motion of the sublunary elements provided "the interpretive grid through which Galileo first read Copernicus" (p. 355a), and this due to its relevance for "a defense of the Earth's motion", as was already stipulated by the second-generation Copernicans (p. 366a).

Kepler could not have been more different:

> "Kepler's project, already evident from his earliest years, was nothing less than a wholesale revision of the principles of the science of the stars – not merely theoretical astronomy (...) but practical astronomy and theoretical and practical astrology" (p. 14b).

In each of these domains, Kepler was a prolific writer throughout the period 1596-1609, further redefining the astronomer's role in at least three ways. First of all, he radicalised second-generation appropriations by approaching the Copernican ordering itself, rather than discrete events, as a symptom or 'footprint' of God's ordained power (p. 316b). Secondly, Westman argues that by 1593, Kepler was already privileging questions of celestial motion in terms of immaterial forces which would also encompass astrological influence. Remarkably, Westman –following Louis Valcke- claims that Kepler's notion of what constituted a credible physical grounding, had itself been shaped by his reading of Pico's *Disputations*. Once again, we have a celestial practitioner seeking to buttress astrology against the Piconian onslaught, but now by borrowing from the critic's own suggestions. This halfway position also shows up in Kepler's conception of practical astrology, which he consistently contrasted with the world of 'ordinary' prognostication. Limiting the strength of celestial inclinations in favor of sublunary human freedom, Kepler was arguing for a situation in which:

> "Politics (...) should not be a monopoly of ordinary astrologers any more than a theology of the natural world should be the unique preserve of theologians" (p. 381b).

Thirdly, Kepler represents a point where celestial practitioners ceased to invoke God as the mere *locus* of an 'ordained power' (whose contours could be inferred from extraordinary phenomena), but rather as a veritable *guarantee* of the possibility of *collapsing* the extraordinary "into the ordinary course of nature" (pp. 385b, 401b). This "naturalist turn", in which the astronomer's map of the heavens was used as a map of all things natural –and not just of all things historical- became widely practiced on the occasion of another nova appearing in 1604. All that was missing now, was a Copernican advancing permanent, rather than exceptional and temporary, novelties in the heavens to argue his case – which is exactly what Galileo began to do in Florence in 1610 (chapters 17-18).

After all this, it should not surprise us to find that the chapter-long conclusion to *CQ* speaks neither of the triumph of Copernicanism, nor of wholesale belief change in the 17th century scientific community. Instead, Westman's perspective is strictly limited to a phenomenon which he characterizes as "closure"; that is, "an end to questioning and criticism from competing alternatives". Westman is wise enough to acknowledge that this (psychological?) situation of 'absence of skepticism' occurred "in different ways among different audiences" (p. 510). Nevertheless, he also makes the double claim that (1) the years 1610-12 marked the end of a thirty-year period "from which there would be no turning back" (pp. 426, 492), and that (2) Kepler and Galileo's later publications:

> "(...) made possible a new sort of multifaceted, robust public debate from the 1620s to the 1640s. (...) This phase of the debate was no longer dominated by prognosticators (...). The emergent voices were those of a new breed of natural philosophers, the likes of Descartes, Gassendi, Marin Mersenne, Hobbes and Wilkins. (...) they quickly subordinated the exclusively astronomical and astrological issues of the earlier period to questions of agreement with their own physical principles and issues of biblical compatibility. The period from the 1620s to the 1640s was, in short, the moment when modernizing natural philosophers captured the Copernican question".

In a way, the end of the long sixteenth century also marked the end of the science of the stars as such. Not only did the new generation of modernizers "inhale" and appropriate many of the theoretical and empirical achievements of Kepler and Galileo (p. 497b); they also rejected traditional astrology *in toto* (p. 513b). Pierre Gassendi did not even countenance its post-Tridentine power to securely predict the future state of crops (pp. 496a), while Isaac Newton collapsed "heavenly influence and catastrophic import" into a few predictable, periodically returning comets (p. 512a).

3. The future of *The Copernican Question*

Robert Westman should be congratulated on having followed his "passion to get to the bottom", rejecting "the sensible advice of friends to get on with my career and republish my earlier studies as a modestly amplified collection" (p. xv). Without a doubt, *CQ* is a landmark in what was already one of the most intensely studied topics in the history of science. As suggested at the beginning of this review, however, this judgment has even more to do with Westman's methodological choices than with the content of its argument.

Contemporary historians of science like to congratulate themselves on having abandoned strong ties to their colleagues in the hard sciences, and on having opened up a critical distance with respect to celebratory narratives, internalist/externalist dichotomies, and absolute boundaries between science and pseudo-science. While I largely concur with the accuracy of the second claim, I am much less convinced about the first. It is becoming increasingly apparent that the 'technical' and 'anthropological' turns which have led us to focus on local knowledge practices, have simply exchanged a doctrinal for a technological definition of science (thus imitating what has happened in the hard sciences), and have done nothing to alter the traditional assumption that science is fundamentally universal and a-historical (since it *will* be encountered in any time and place which the historian of science chooses to visit). Under such circumstances, it should not surprise us that fewer and fewer professional historians of science feel the urge to tell 'grand narratives' and that when they do, the actual progress made over the past few decades turns out to be discouragingly small.

CQ does nothing less than to try and develop a methodological perspective which can avoid such pitfalls, applied to one of the backbones of what is probably the prime grand narrative in the history of science: the Scientific Revolution. Taking a big step back from Robert Westman's intimidatingly thick volume, I would say that this is not the story of a scientific doctrine, nor of the relation between different social institutions devoted to knowledge production. Instead, it seems to me that Westman's story privileges a desire to lay claim to a proper domain, as this manifests itself in the discourse of the science of the stars. For Westman, this desire appears to be relative to a broader situation in which a (theological) power granting authority to 'traditionalists' in natural philosophy and mathematics, curtails such claims. Accordingly, this act of laying claim is not only a highly

performative one, carried out in and through the act of defending an alternative planetary arrangement, but also one which increasingly uses this alternative as a metaphor around which to develop and voice a 'proper' theological and natural-philosophical position. It is precisely in this attempt to honor performativity and metaphor, I believe, that *CQ* carves out a highly significant and helpful difference with respect to more traditional social histories of science.

At the same time, I agree with Westman's conviction that "historical narratives, like the meanings we make of our lives, are always subject to revision and reinterpretation" (p. xv). On a few occasions, I found that such revisions could be the result of a second look at the relevant primary sources. For instance, I doubt whether the evidence supports Westman's contention that Michael Mästlin "openly broke with Aristotle's doctrine of celestial immutability" (p. 261b). Likewise, Westman's translation of the prognosticator Avogario's "extraordinarily revealing letter" to the duke of Ferrara (1479), completely erases Avogario's explicit reference to God, "the supreme king" (p. 72b).

This last point brings me to a second source of salutary future revisions: a more thorough and sustained attention to the proper concerns of Renaissance theology and astrology. As a historian who ventures into the history of science from the angle of early modern 'religion' and 'magic', it was readily apparent to me that Westman's narrative was based on the exact opposite movement. As I have argued in a recent paper, early Renaissance prognostication was not about obtaining "secure knowledge of the future" (p. 171a) at all.[3] Indeed, my initial reading of *CQ* saddled me with the impression that this narrative, at heart, is not really about astrology, but rather about a human desire to impose *regularity* on the behavior of the visible – thus obscuring astrology's traditional concern with the passions and embodiment while crediting it with a proto-scientific obsession with 'knowledge' and 'certainty'. As far as I can tell, Westman's portrait of Renaissance astrologers as monopolizing naturalists, laying claim to ever greater portions of the visible (and the invisible) while thriving on popular anxiety and uncertainty, is more agreeable with old standard narratives in the history of astrology and magic than with Renaissance astrological discourse. Equally dubious, I believe, is Westman's frequent construal of the social group called 'the theologians' as primarily invested in the safeguarding of their authority, and attacking astrology to the extent that its ambitions with respect to human knowledge of the future undermined this authority (cf. p. 12b).

One way in which to open up a future for *CQ*, then, is by paying more attention to past celestial practitioner's *own* understandings of their lived relations to the visible heavens and to the invisible God of Israel (i.e., in Westman's terms, to the divine *potentia absoluta* rather than *potentia ordinata*), while heeding the important methodological advances carved out in *CQ*. In doing so, I predict, historians will give extraordinary longevity and meaningfulness to the Copernican question.

[3] Cf. Steven Vanden Broecke, "The stars, the sublunary world, and the social body. On the specific rationality of early Renaissance prognostications", forthcoming in: *From Mash'allah to Kepler*, eds. Charles Burnett & Dorian Greenbaum.